STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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GOVERNOR

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North Carolina Board of Transportation
Environmental Planning and Policy Committee
Meeting Minutes for March 31, 2004

A meeting of the Environmental Planning and Policy Committee (EPPC) was held on March 31, 2004 at 8:30 AM in the Board Room (Room 150) of the Transportation Building. Nina Szlosberg chaired the meeting. Other Board of Transportation members that attended were:

Tom Betts	Nancy Dunn
Conrad Burrell	Bob Collier
Mac Campbell	Cam McRae
Marion Cowell	Lanny Wilson

Other attendees included:

Bob Andrews	Tim Johnson	Len Sanderson
Christie Barbee	Don Lee	Ruth Sappie
Judith Corley-Lay	Sharon Lipscomb	Roger Sheats
Craig Deal	April Little	John Sullivan
Patty Eason	Odessa McGlown	Jay Swain
Ed Eatmon	Ehren Meister	Greg Thorpe
C. A. Gardner	Ashley Memory	Sec. Lyndo Tippett
Carl Goode	Sarah Mitchell	Charles Tomlinson
Rob Hanson	Barry Moose	Steve Varnedoe
M. L. Holder	Jon Nance	Don Voelker
Julie Hunkins	Sandy Nance	Ron Watson
Pay Ivey	Ken Pace	Marcus Wilner
Berry Jenkins	Allen Pope	

Ms. Szlosberg called the meeting to order at 8:30 AM and accepted a motion to approve the meeting minutes from the February committee meeting as presented. Ms. Szlosberg noted there was one major item on the agenda – Hot-In-Place Asphalt. Hot-In-Place (HIP) Recycling is another tool that might be considered to have a positive environmental effect. Ms. Szlosberg introduced Steve Varnedoe, Chief Engineer of Operations for the Division of Highways to present on the current state of HIP.

Mr. Varnedoe recognized Dr. Judith Corley-Lay, head of the Pavement Management Unit. She is a nationally renowned expert in pavements. Dr. Corley-Lay was there to answer any technical questions.

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HIP recycling is one of many tools used in pavement preservation. For the last 8 to 10 years at the national level, Federal Highway Administration and others have been promoting this concept of pavement preservation. Typically, most state DOTs, including the NC Department of Transportation (NCDOT), have operated under a worse-first philosophy. In other words, the roads in the worst condition are the roads selected first for paving. This is a self-defeating philosophy of conducting business because if you continually work on the roads in bad shape, your whole system has a tendency to continue to decline. Pavement preservation takes a different approach. The aim is to keep good roads in good condition. Through Senate Bill 1005, improvements were made to existing primary highways that were in reasonably good condition. Pavement preservation advocates the use of different tools and techniques. The cheapest technique used to improve pavement is crack sealant. As soon as there are signs of distress in the pavement, the cracks are sealed to keep moisture from getting in the pavement. This is followed by a less expensive very thin surface treatment, like chip seal, to seal the surface. This treatment can be used on high volume roadways. The idea is to extend the life of the pavement. DOT's "bread and butter" in pavement preservation efforts have been hot mix asphalt, such as 1-1 ½" overlays. This process has been used for many years. Unfortunately, the way our funding has been, we have been using this thin asphalt overlay to try to hold our whole system together with the allocation we receive for contractor services, and this has not worked very well. Pavement preservation would go as far as what would be considered minor rehabilitation.

HIP recycling fits into the last part of the higher end of pavement preservation. The aim is to try to maintain the roads that are in good condition and continue to extend the life of those pavements and keep them from deteriorating any further. HIP recycling is a process that consists of heating the existing asphalt to soften it, scarifying the softened asphalt, adding rejuvenator and virgin material, mixing and compacting to provide a finished surface. An overlay may or may not be added after the HIP treatment. Over time, the asphalt pavement is oxidized by the sun and rain, and the top surface becomes aged and worn. HIP recycling rejuvenates the pavement, and lays it back down.

In North Carolina, we have two ways of recycling. HIP is one way. The other way is to mill off 1½-2" of asphalt and put down new asphalt. Either way you are recycling because the asphalt that is milled goes back to the asphalt plant and used again in HIP.

Ms. Szlosberg wanted to know what happens to milled asphalt that is not recycled on site. Mr. Varnedoe stated that about 15% of the milled asphalt can be used in the hot mix and this will lower the price. This process has been used since the early 1980's. This is approximately a 15-85% split. The other asphalt is carried back to the asphalt plant and recycled.

This process is not a "silver bullet" and you must be very careful when selecting projects for HIP treatment. There are a number of considerations that must be made when selecting a project for HIP recycling:

- Ability have a long paving train
- Significant mobilization effort
- Some limited ability to modify the surface graduation
- Rejuvenator needed because asphalt surface is aged, dry and brittle

The paving train is extremely long and the pavement width must be 11 feet or greater, which rules out most work on secondary roads. There are very few contractors in the country that can handle this type of work. Most of the contractors travel around the country, so in order to get them into your state, you need a large project. The following is the selection criteria for a project:

- Project length of 7 miles or more
- Adequate pavement width (at least 22' with at least 3' of stable shoulders on each side)
- Relatively uniform pavement with limited patching
- Adequate pavement strength for future loads
- Need location(s) to "park the train" overnight
- Little or no stripping in existing pavement
- No more than light, shallow structural distress (alligator cracking)
- Need to evaluate site regarding alignment and utility issues

Board Member Tom Betts wanted to know the average cost per mile. Mr. Varnedoe replied that it costs about $5 per square yard and in the range of what a 1½" asphalt overlay would cost.

Board Member Mac Campbell wanted to know if there were any contractors in North Carolina that can provide this service. Mr. Varnedoe responded there are no contractors in North Carolina that have the proper equipment. The equipment is very expensive. NCDOT has used a contractor from Texas. Production is approximately 1 mile per day and looks similar to typical asphalt.

HIP is ideal when you need the following:

- To address normal wear
- To address environmental defects like block cracking or transverse cracking and oxidation
- To provide a smooth riding surface

One of the first projects where HIP recycling was used in North Carolina was in 1997 in Division 6 on NC-87 from Elizabethtown to the Columbus County line, which was a 20-mile project. It is still performing well today.

To determine how HIP is performing, a pavement condition survey is conducted on all the paved roads every 2 years. Condition ratings index are from 0 -100, with 0 being very bad and 100 being the best road to perpetrate. Roads that are below 60 are in relatively poor condition. Typically, roads with an index of 60 or better perform better. If the pavement is in poor condition at the time HIP recycling is used, the road does not maintain a higher performance as well as those in good condition.

Each year NCDOT compiles a report for the FHWA on the International Roughness Index (IRI) of our state's roads. (IRI is a performance measure of the ride quality.) Equipment is used to determine the roughness on our pavements. If the IRI is less than 100, this is considered a descent ride quality on the road. After using HIP on the highways, the results of the IRI were good.

The following are current or recent projects where HIP was used:

- US-70 in Lenoir County
- US-70 in Durham County

- US-70 in Buncombe County
- US-264 in Pitt County
- Others

The Pavement Management Unit has recommended using HIP recycling as a potential solution in every division and nine of the fourteen divisions have completed projects. Since the implementation of HIP in North Carolina in 1997, NCDOT has completed approximately 350 total miles statewide, which is a significant amount of work.

NCDOT has an alternative bid process that is used for HIP. This process will allow HIP contractors to bid on recycling two inches of existing pavement or they can bid to conventionally mill off two inches and put two inches of hot mix asphalt back down. This will allow the contractor a choice of using HIP or the conventional method, which creates competitive bidding. The end result should be a lower cost to NCDOT.

There are a range of prices for preservation "fixes". Factors to compare when choosing which method to use would consist of life extension, the roughness of the ride and the cost. The following is a chart that shows relative costs of tools in the toolbox (based on NHI 13108):

- Crack Seal Very Low
- Chip Seal $0.95
- Slurry Seal $0.90
- Microsurfacing $1.55
- 1.5" Surface Course $3.00
- HIP $3.40
- Mill and Fill (2.5") $4.50

Crack seal is used by the square yard, but it is very inexpensive. Chip seal is used on the lower lying roads that are in relatively good condition. It's a rougher ride than asphalt, but you get about a seven year life out of this treatment. Slurry seal is similar to chip seal, but with a smoother ride. This process is used in subdivisions. Microsurfacing is a higher type of slurry seal. This is used on roads which are in good condition and that don't have a lot of stress (cracking) in it, just a little aging. This treatment will last seven to eight years. The method most used in North Carolina is hot mix asphalt (1.5" surface course). HIP and "mill and fill" are equal types of alternatives and fairly competitive.

North Carolina has 73,000 miles of pavement to preserve and this typically has been achieved through resurfacing with only $150 million per year, which does not address our needs. Through Senate Bill 1005 we have received $470 million over the past three years to address a lot of our primary highways and to get them back into good shape. After North Carolina Moving Ahead, we will need more money to keep roads in shape.

Since using the alternate bid process, of ten projects that were let, five projects used HIP and five used "mill and fill". This is good competition between the two types of activity. The price for HIP has ranged from $2.74/square yard to $5.23/square yard. Board Member Nancy Dunn asked what causes such a wide variation in the cost. Mr. Varnedoe responded a number of things can cause this variation, such as the quantity or length of the project. The add/mix costs could vary. Some projects must be worked on at night due to traffic which makes the price go up.

Board Member Tom Betts asked whether there is any indication that the North Carolina contractors would get into this business soon. Mr. Varnedoe responded that North Carolina was working with Carolina Asphalt Pavement Association (CAPA) on a pilot program. They wanted to compare HIP to "mill and fill". They wanted different HIP recycle contractors to come in and perform their process so we could compare process to process. Only one contractor came in to do the job. If HIP is viable and there is a market for it, then industry will come along. It's a wait and see approach.

Board Member Conrad Burrell stated that in the past, local contractors haven't liked the bid process. They felt it was unfair because we are not comparing apples to apples. He asked what the percentage is of roads that are eligible for HIP -- less than 15%? Mr. Varnedoe responded that approximately 10,000 miles of pavement conditions are applicable.

Ms. Szlosberg asked whether there is anything we can do to provide an incentive to local contractors or provide a market so they feel more comfortable about their investments. Mr. Varnedoe referred this question to Dr. Corley-Lay to talk about the research project on US 301 in Wilson County. Dr. Corley-Lay stated that in this project, DOT paved one direction of US 301 with hot mix asphalt treatment. In the other direction, we paved two-mile sections of four different mixes. Each direction has comparable traffic. Every year the Pavement Management Section would measure the pavement condition. They checked for frequency of cracking, ride quality, and skid on both directions. This process would last for eight to ten years, which is the length of time a treatment was expected to last. We didn't want to support certain methods but rather improve each type and optimize performance across the board. This project started in around 1997, so we only have six years of performance data.

Christie Barbee with CAPA stated that the more preservation/preventive work that is performed, and the better shape we get our roads in, the more opportunity for HIP recyling. She elaborated that we need more money, not for the worse-first philosophy, but for preserving the system if we want to use HIP recycling. Mr. Varnedoe added that we need $300 million each year to sustain our pavement conditions on the primary and secondary roads. This figure does not include the interstate system. With this whole concept of preservation treatments and using them effectively, for every $1 spent at the right time, we can save $4 to $6 on preservation. If you let the pavement deteriorate, you're just throwing money away.

Board Member Marion Cowell asked was there any evolution in the equipment from a cost standpoint or that would make it more adaptable to less specific conditions on the road? Mr. Varnedoe stated that if there was a need on a recurring basis, he felt like the manufacturer of the equipment would try to meet that need. As it exists today, all the equipment manufactured can only go down to 11 feet. There are only two or three manufacturers of this equipment.

Ms. Szlosberg noted that HIP recycling has less of an environmental impact since we are recycling. This sends a message that we are aware of the impact and that we are walking the walk on our environmental stewardship policy. We need to try to use this process as much as possible.

Board Member Tom Betts would like for DOT to contact the industry to find out where they are now on the equipment and report back to the Board. There could be some changes that would be more adaptable to our

road conditions. Mr. Varnedoe will report back to the Board. Dr. Corley-Lay noted that FHWA has the possibility of scaling down equipment to increase opportunities.
Board Member Bob Collier asked to what extent do we exchange information with other states and with the federal government about our research so everybody doesn't re-invent the wheel. Mr. Varnedoe replied that a great deal of information is exchanged. Mr. Varnedoe is on a panel that determines how much research is being done by the 50 states on pavement preservation so every state is not researching the same thing.

Ms. Szlosberg thanked Mr. Varnedoe and Dr. Corley-Lay for their presentation. She stated that she likes it when we ask the question, "what can we do" instead of "what we can't do". NCDOT is looking more extensively at laying out the criteria and going for it. It shows a spirit of innovation that makes North Carolina a leader.

Ms. Szlosberg commented that due to the lack of time, the committee would not be able to discuss the organic waste initiative. The working group is moving forward with this issue and will report back at a later meeting. Ms. Szlosberg adjourned the meeting at 9:35 AM.

The next meeting for the Environmental Planning and Policy Committee is scheduled for Wednesday, May 5, 2004 at 8:30 AM in the Board Room (Room 150) of the Transportation Building.

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